HERMAPHRODITISM OF A CROAKER,[1] *MICROPOGON UNDULATUS* (LINNAEUS)

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During the months of July and August, 1920, a large number of croakers, *Micropogon undulatus* (Linnaeus), were taken in the pound nets operated at Young's Million Dollar Pier, Atlantic City, New Jersey. They appeared to be approaching the spawning season rapidly and some males were found from which milt would flow. No females were taken with ripe eggs however, so on August 9, when what appeared to be a female turgid with eggs was taken, considerable interest was aroused. Its proportions were as follows:

Total length	32	cm.
Standard length	27	cm.
Body depth	9.5	cm.

Externally it appeared to be normal in all respects and when it was found that stripping was not possible, curiosity prompted dissection. The explanation of its great body depth was apparent when it was seen that perfect sets of both ovaries and testes were present. The testes lay dorsal of the ovaries, but in all other respects the internal anatomy was of the usual character.

In the accompanying semi-diagramatic sketch of the ventral aspect of the dissected specimen all fatty tissue and mesentary membranes have been omitted. Only the digestive tract and sexual organs have been shown in detail. The stomach appears as a very small appendage, but that is the normal

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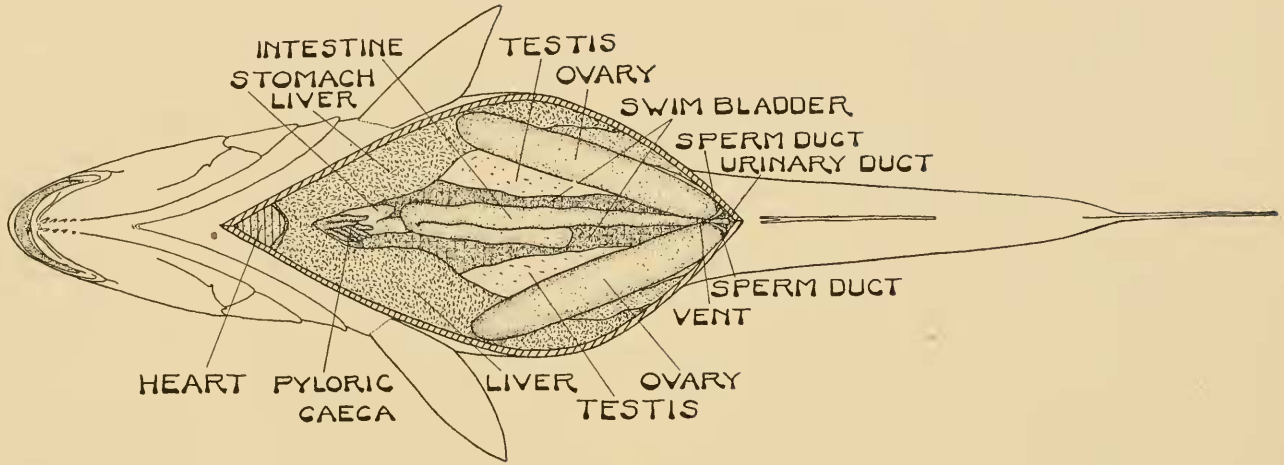
INTESTINE
STOMACH
LIVER
TESTIS
OVARY
SWIM BLADDER
SPERM DUCT
URINARY DUCT
SPERM DUCT
VENT
HEART
PYLORIC
CAECA
LIVER
OVARY
TESTIS

FIG. 97.

condition of the organ when the individual has not been feeding.

The only displacement of the viscera, other than that caused by the spreading due to opening the fish, is that of moving the anterior ends of the ovaries outward so as to show the testes lying dorsally of them. Before this separation, the ovaries were nearly parallel to each other and appressed against either side of the intestine. The paired fins indicated are the ventrals, the pectorals not being shown as the open flaps of body wall hide them completely.

The junction of the ova, sperm and urinary ducts appeared to be at the genital pore. This is shown in the diagram just posterior to the vent. The spermatic ducts can be seen passing around the rear end of the distended ovaries, which extend backward past the genital pore. The urinary duct passes between the posterior ends of the ovaries as it descends from the kidneys lying dorsally of the swim bladder, and is flexed forward to the external opening.

Both sets of gonads seemed well developed and in the state most frequently found in normal individuals of this species taken about the same time as this sportive example. The testes were soft and flocculent, and easily ruptured, the milt streaming out from such injuries, but they were not quite ripe enough to strip, and the ovaries were also a little too green for that operation.

Most previous records of hermaphroditism in fishes tell of one set being much in advance of the other in regard to development, but this specimen suggests speculation on the possibility of self-fertilization, which mechanically, at least, appears to be entirely possible. Scale examination and size indicate that this fish was about five years old and has therefore passed through at least one spawning season. The age of the fish together with the fact that the gonads were normal in themselves, strongly suggests that this is a case of functional hermaphroditism of which we have three possible methods of function: that is, self fertilization, and mating with other fish, either as

the male or female element or alternately, as first one and then the other.

To the best of the writer's knowledge bi-sexuality in teleosts has been recorded only from the following families and orders; *Cyprinidae, Clupeidae, Salmonidae, Esocidae, Poeciliidae, Gasterosteidae, Mugilidae, Percidae, Serranidae, Sparidae, Scombridae, Labridae, Squamipinnes, Gadidae* and *Pleuronectidae.*[2]

It is believed that no additions have been made to the above list up to the present time, so this notice stands as record of the addition of the *Sciaenidae* to it.

C. Stewart, in the Journal of the London Linnean Society (Zool.) 24 pp. 70-71, mentions the most nearly similar case, which is among the *Scombridae.* This is apparently the only other record in which the abnormality has approached symmetry; but even in the case of the mackerel the organs failed to reach the degree of symmetry found in the present specimen.

This example of abnormal hermaphroditism is now deposited in the U. S. National Museum, number 66140.

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[2]This list, excepting the *Poeciliidae* and *Serranidae* was recorded by James E. Gemmill in his publication, "The Teratology of Fishes", 1912, James Maclehase & Sons, Glasgow, Pub. The occurrence of this type of monstrosity among the *Poeciliidae* was recorded by H. H. Newman, 1908 "A Significant case of Hermaphoditism in fish", Biol. Bull. Woods Hole, Mass., pp. 207-214. This reference however was listed in Gemmill's bibliography. The *Serranidae* are included in this list on D. S. Jordan's authority. In his "Guide to the Study of Fishes" 1905, p. 124, Holt & Co., N. Y., Pub., he states that *Serranus* is "sometimes truly hermaphroditic."